Risk Parity Optimality

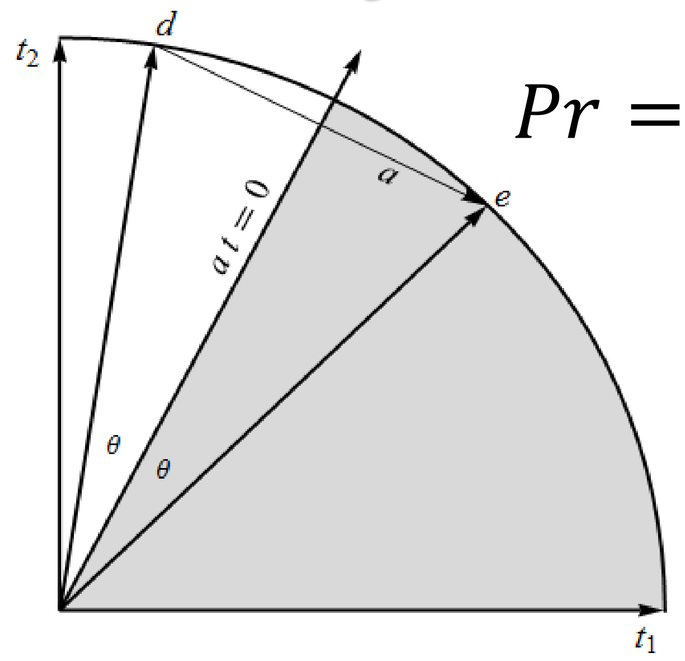
Journal of Portfolio Management (2015), 41:2, 42-56

Gregg S. Fisher, Philip Z. Maymin*, Zakhar G. Maymin
***Trefz School of Business**
University of Bridgeport, Bridgeport, CT

Risk parity is a hot new portfolio allocation strategy. You just weigh assets according to their risk. *But why does it work?*

We prove mathematically using game theory that:

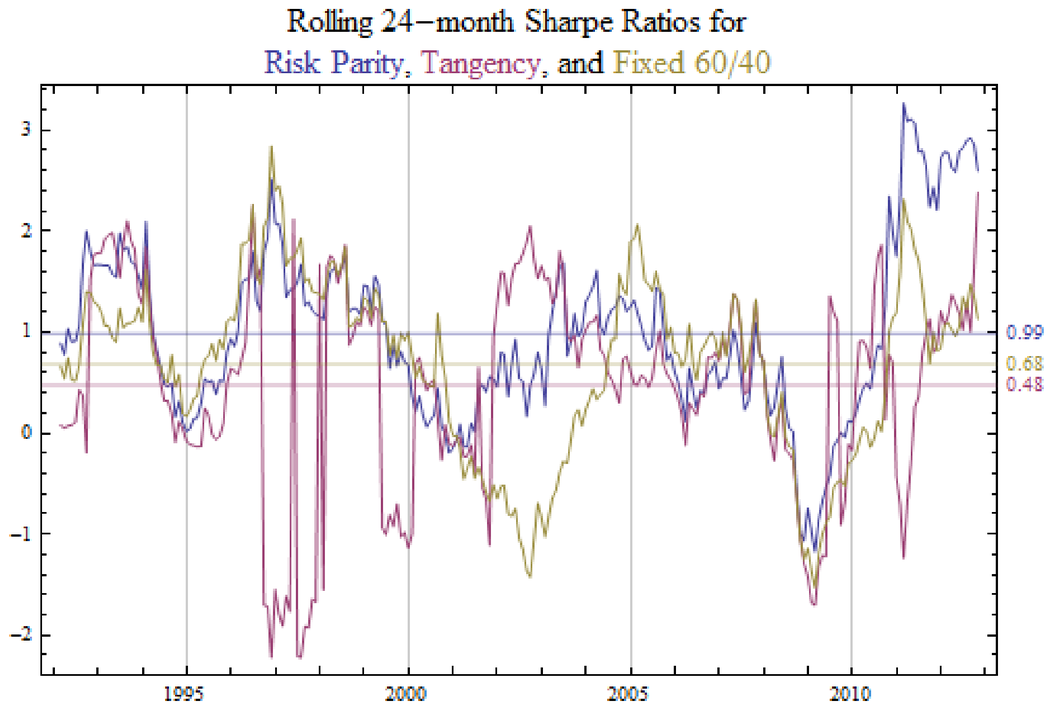
A risk parity portfolio will outperform an equally weighted portfolio, a passive market portfolio, or *any other* market portfolio, **more than 50% of the time.** (See shaded region.)



$$Pr = \frac{\pi/4 + \theta}{\pi/2}$$

We confirm empirically using asset class returns that:

Risk parity does outperform *both* the standard academic strategy (tangency portfolio) and the standard practitioner strategy (60/40 equity/bond). RP has a 0.99 Sharpe ratio; 60/40 0.68, and tangency 0.48.



We test if our prediction about the angle is true and find that:

The risk parity angle is *indeed* closer to the truth.

n	$\Pr(\theta_{RP} < \theta_T)$	$\overline{\theta_{RP}}$	$\overline{\theta_T}$
12	57.66%	28.79°	39.25°
24	62.80%	34.13°	45.87°
36	80.97%	37.22°	59.12°
48	75.74%	33.93°	51.86°
60	74.72%	29.77°	56.26°